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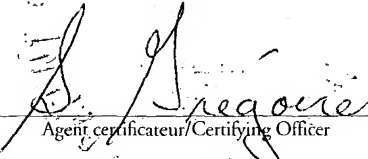
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Specification and Drawings as originally filed, with Application for Patent Serial
No: **2,393,119**, on July 12, 2002, by **BOURGAULT INDUSTRIES LTD.**, assignee of
Jason Kirsch, for "Unloading System for Particulate Material".


Agent certificateur/Certifying Officer

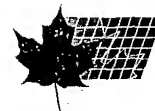
July 3, 2003

Date

Canada

(CIPO 68)
04-09-02

OPIC



CIPO

ABSTRACT

This invention concerns a new grain unloading system using an integrated ramp, horizontal transfer and elevating system. The unit is towed, positioned and powered by a tractor.

Unloading System

Background

In farming, "grain augers" have been used to unload granular agricultural materials from trucks into bins for many years.

Over the years, the scale of farms and of the equipment used in farming has progressively increased. Formerly, loading/unloading augers were small and light, and it was possible for a physically fit operator to manually position them for operation relative to the inlet opening in a bin. It was also possible for a reasonably skilled operator to back up a simple dump truck & position its discharge chute over the inlet of a material transfer auger. Also in the past, a helper was often available to assist with the physical movement of equipment and to provide guidance in positioning the truck.

As large grain auger/conveyors have come into use, it is no longer possible to position them by hand, and some are sufficiently large to require tractors to tow, position and power them. Much less manoeuvrable semi-trailer trucks are utilized to haul agricultural materials. It is often difficult or impossible to manoeuvre a semi-trailer truck into position relative to a conventional unloading system.

Also, because the work on a grain farm is seasonal in nature, and opportunities for full time employment have continuously increased over time, there has been less and less labor available on the typical farm. Whereas in the past there may have been assistance available for re-positioning equipment, that is no longer the case in many situations. To compound the problem, the age of the farming population has increased significantly. Farmer operators are less able to perform physically demanding tasks.

With fewer available operators, the time of the farmer/operator is increasingly valuable.

Safety is also an issue when an operator is working alone, as farmers are often required to do.

With current economic pressures, farming operations increasingly demand equipment that is safe, simple & easy to use and maintain, cost effective, & which offers the highest possible overall efficiency of use.

To address these needs, industry has responded with innovations in equipment design. Various adaptations of existing equipment have been devised.

The current standard in the industry is the swing-away type screw auger that is connected to an agricultural tractor. The system has a lower swing-able portion that is swung under a grain trailer's unloading chutes. The lower transfer auger then unloads onto the main transfer auger. This is a somewhat cumbersome system that requires the swingable auger to be swung under the grain trailer and removed each time the trailer is unloaded. If the trailer is a Super B type, meaning that two trailers with a fifth wheel pivot and a set of three axles are located in between the unloading chutes of each trailer, the swingable auger has to be swung under and from under each of the trailers.

The tractor is connected to the swing-away auger system at the outboard end of the main transfer auger. The swing-away portion is then typically approximately 90 degrees to the main transfer auger to allow the grain trailer to approach the unloading system close enough to allow for unloading. This arrangement is often not convenient or even suitable for some yards where the ability to maneuver the power unit and the grain trailer is restricted by the grain bins themselves, buildings, overhead power lines or tree lines.

In an attempt to improve upon the swing-away auger system, various types of ramps and combinations of ramp and self-contained intermediate transfer augers have been devised which make it possible to simply drive a truck or semi-trailer over the inlet of the transfer auger system, greatly facilitating use and eliminating the need for positioning of the unloading equipment for each truckload.

However, this equipment is typically cumbersome, complex and costly. Either a separate tractor is required to position the equipment or it is necessary to disconnect the tractor that is powering the unloading auger for the purpose of positioning the ramp & auxiliary auger system. Each piece of the unloading equipment system must still be separately positioned when moving from one bin to another, consuming valuable time. Complexity leads to more required maintenance, a higher probability of breakdown and increased costs. High cost compounds the economic pressures on farming operations.

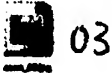
One solution to this problem that has been devised consists of a horizontal transfer conveyor and an elevating conveyor integrated into a single unit. The unit is conveniently towed and powered by the same tractor. A ramp system is incorporated. The sidewalls of the receiving hopper of the conveyor unit are made of rubber and the support for the horizontal section of the transfer belt is made sufficiently strong as to allow a truck to simply drive over that section. While this system addresses some of the needs, it is limited to the use of a belt type conveyor and the inlet portion of the transfer auger is relatively narrow, which may limit the rate at which material can be received. However, this system has not found widespread market acceptance.

- It is the object of Bourgault Industries' invention to improve upon the equipment that is currently available. A completely integrated ramp, horizontal transfer & elevating system is provided that allows for the use of any type of conventional conveying means (bucket, belt, screw). The unit is towed/positioned and powered by the same tractor. The design is simple, cost-effective and conveniently & safely operable by one person from the tractor cab. The design incorporates folding ramps for compact transport. The folding ramps are hydraulically powered for convenience and ease of use. All towing, positioning and operating functions are conveniently and easily operated from the tractor cab.

Existing Art - Advantages & Limitations - Illustrations:

1. Conventional swing away auger

- See screw type auger advertisement, (Westfield - digital image Scan_03.jpg) and belt conveyor advertisement (digital image Scan_05.jpg):



03



05

- Requires awkward, less than ideal positioning of auger and its power unit.
- Requires manual handling of the swing away auger extension before and after unloading, and for each trailer in a semi-trailer train.
- (User has to jockey the auger, truck, or both.)

2. Ramp system for conventional swing away auger

- See RampOver advertisement (digital image Scan_04.jpg):



04

- Same awkward, less than ideal positioning of auger and power unit.
- Same initial manual handling of the swing away auger extension.
- Separate handling of the ramp is needed.
- Ramp is too large to be handled manually ... so requires another tractor carry & position it, or the tractor that is being used to power the auger needs to be disconnected from the main elevating device, and re-connected before and after (respectively) the positioning of the ramp. That process needs to be repeated each time the auger is moved to a different bin.

3. Transfer conveyor and ramp combination

- See "Portable Pit" screw type auger advertisement (digital image Scan_01.jpg).



01

- ramp with pit & twin screw lateral transfer augers;

- single screw intermediate auger;
- built into a trailer unit.

- See also "ConveyAll" belt type conveyor advertisement (digital image Scan_06.jpg):



06

- Ramp detachable from transfer conveyor.
- With both of these systems, there are either one or two components (lateral/intermediate transfer unit and ramp) in addition to the main elevating device that must be handled / positioned each time the loading system is relocated.
- Components are too large to be handled manually ... so another tractor is required to carry & position. Otherwise, the tractor that is being used to power the main elevating device needs to be disconnected, and re-connected before and after (respectively) the positioning of the intermediate transfer unit & ramp. That process needs to be repeated each time the auger is moved to a different bin.
- Expensive, separately powered intermediate transfer system.

4. Belt conveyor with ramps, flexible-walled hopper & drive-over belt conveyor

- See InnoVeyor advertisement (digital image Scan_02.jpg):



02

- **Benefits:**
 - Allows normal positioning of elevating auger relative to bin.
 - Lateral transfer section, complete with ramps is integrated with the elevating section, eliminating the need for separate handling & positioning of ramps & transfer section.
 - Lateral transfer section and elevating section share a common towing/power unit (simplicity).
 - Incorporates a hitch for towing and wheels for trailering the entire lateral transfer and elevating unit.
- **Drawbacks:**
 - Limited to a belt-type conveyor ... to be able to drive on it without damaging it.
 - Requires a heavy transfer structure ... also to enable driving on it.
 - Lateral and elevating conveyor are of the same type ... utilize the same belt.
 - Relatively narrow opening to receive material. (May be because the width of the belt is limited to that which can be used in the elevating section.) (Also, the structure / mechanism needed to support and operate a drive-over belt may be relatively tall ... which

would limit the clearance above the device and thereby also the size of the opening into which material can be dumped.)

- A hydraulic cylinder is used to position and hold rigid the joint between the lateral and the elevating sections of the device. The structures of both sections must therefore be sufficiently strong to bear the bending that tends to occur in this area. If an error is made in positioning the transfer section for use, or if part of the lateral transfer section sinks into soft soil under the weight of the truck/trailer, an undue stress is imposed on the structure. It is not likely to be economical to build the unit heavy enough to withstand such loading.
- Note: This product was introduced to the market in about 1994, but has not been seen since. It appears that it did not gain acceptance and has not been brought to a full "production level".

Bourgois Industries Ltd. Invention: - See sketches provided previously. See also illustrations of equipment layout problems & solutions to follow by FAX.

- Benefits:

Similar to item 4 above, in that:

- Allows normal positioning of elevating auger relative to bin.
- Lateral transfer section, complete with ramps is integrated with the elevating section, eliminating the need for separate handling & positioning of ramps & transfer section. Towing / power unit can remain engaged both for operating and for repositioning.
- Lateral transfer section and elevating section share a common power supply (simplicity).
- Incorporates a hitch for towing and wheels for trailering the entire lateral transfer and elevating unit.

- Key differentiating features are:

- The unit is a 2-stage system consisting of a substantially horizontal transfer section and a sloped elevating section. As such, the different sections can be either or any combination of screw/auger, belt or bucket conveyor, as may be desired. However, the 2 stages are integrated into a single unit and share the same towing/power unit.
- The horizontal and elevating sections are hinged where they join to provide relative vertical flexibility while maintaining horizontal rigidity.
- Wheels, at the hinge area where the discharge of the horizontal transfer section and the inlet of the elevating section meet, carry the weight of those parts of the system.
- Folding ramps for compact transport are incorporated.
- Folding ramps are hydraulically powered for convenience and ease of use.
- All towing, positioning and operating functions are conveniently and easily operated from the tractor cab.

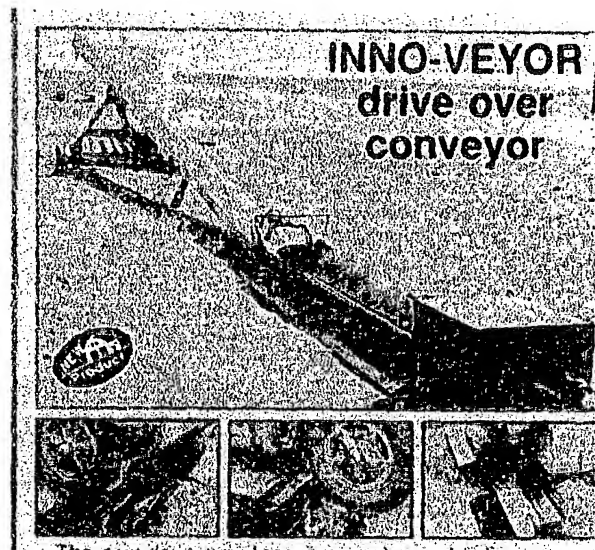
Unloading System Patent Application

Claims

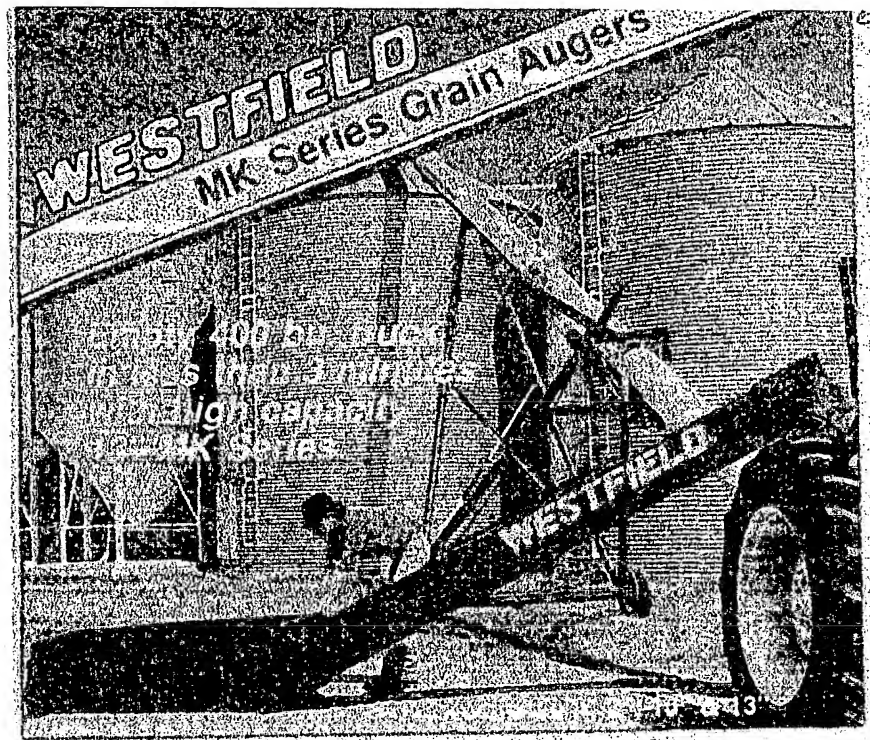
1. A particulate material unloading system including:
 - a) a ridged platform resting on the surface of the ground for supporting a particulate material transporting vehicle where the longitudinal axis of said platform coincides with the longitudinal axis of said particulate material transporting vehicle,
 - b) said platform pivotally attached to a motive power source for moving said particulate material unloading system from one location to another where said longitudinal axis of said platform is generally at right angles to the longitudinal axis of said motive power source when said motive power source is travelling in a straight line,
 - c) said platform being capable of receiving particulate material discharged from said particulate material transporting vehicle,
 - d) a main particulate material conveyance device pivotally attached to said platform on the opposite side to which said motive power source is attached to said platform such that the longitudinal axis of said main particulate material conveyance device is always at a substantially right angle to said longitudinal axis of said platform,
 - e) said main particulate material conveyance device is capable of delivering said particulate material to a holding bin,
 - f) a secondary particulate material conveyance device for transferring said particulate material received by said platform to said main particulate material conveyance device, such that said platform remains connected to said motive power source and said main particulate material conveyance device during the unloading operation and also when moving said particulate material unloading system from one area to another.
2. A particulate material unloading system as in claim 1 where said motive power source not only provides the power required to transport the particulate material unloading system from one location to another but also to operate both said main and secondary material conveyance devices.
3. A platform as in claim 1 that has upper, lower and side surfaces for receiving and containing said particulate material.
4. A platform as in claim 1 that has a semi-open upper surface allowing said particulate material to flow into said platform and to said secondary material conveyance device.
5. A platform as in claim 1 where said platform is foldable to reduce its transporting dimensions.
6. A platform as in claim 1 where said platform is hydraulically foldable to reduce its transporting dimensions.
7. A platform as in claim 6 where the power to hydraulically fold said platform to reduce its transporting dimensions is provided by said motive power source.

8. A platform as in claim 1 is constructed from steel.
 9. A main particulate material conveyance device as in claim 1 is a screw conveyor.
 10. A main particulate material conveyance device as in claim 1 is a belt conveyor.
 11. A main particulate material conveyance device as in claim 1 is bucket elevator.
 12. A main particulate material conveyance device as in claim 1 that is a paddle elevator.
 13. A secondary particulate material conveyance device as in claim 1 is a screw conveyor.
 14. A secondary particulate material conveyance device as in claim 1 includes multiple screws.
 15. A secondary particulate material conveyance device as in claim 1 is a belt conveyor.
 16. A secondary particulate material conveyance device as in claim 1 is a paddle conveyor.
 17. A system as in claim 1 where said motive power source provides power to said secondary conveyance device and said main particulate material conveyance device.
-

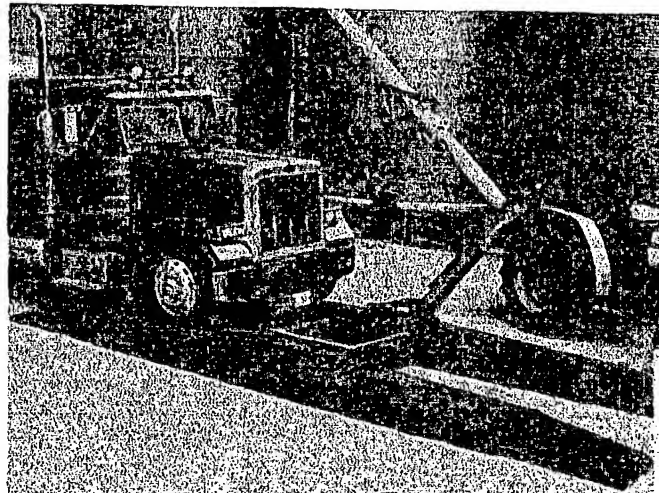
SCAN-02.jpg



SCAN - 03.jpg



SCAN - 04.jpg

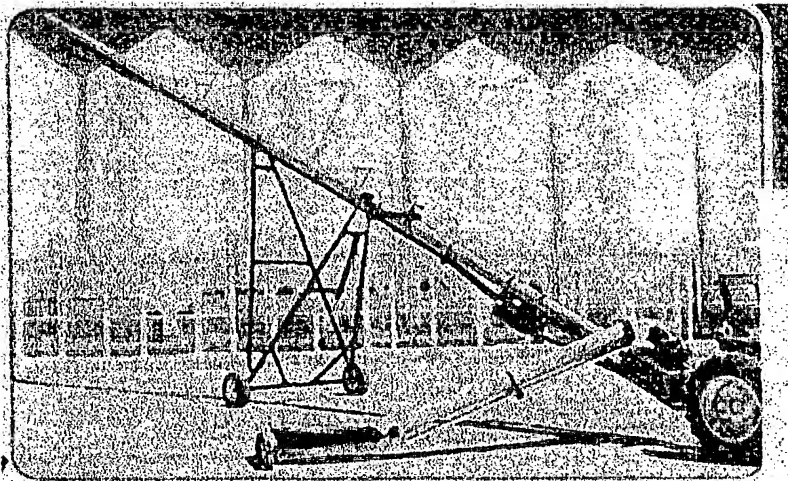


RampOver

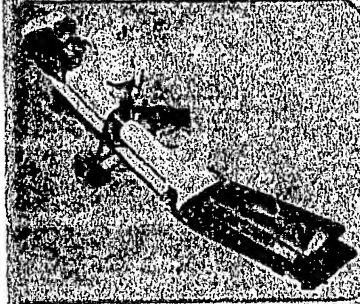
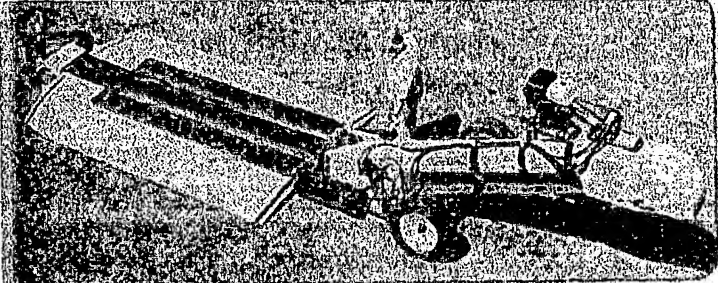
- Makes easy work of unloading rear dump, belly dump or side dump units
- For use with MK 100 and MK 130 low profile swing-hopper augers
- Fully portable
- Sets up in minutes

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SCAN-05.jpg



comparable to a 13" auger. With pulses and fertilizer capacity is better



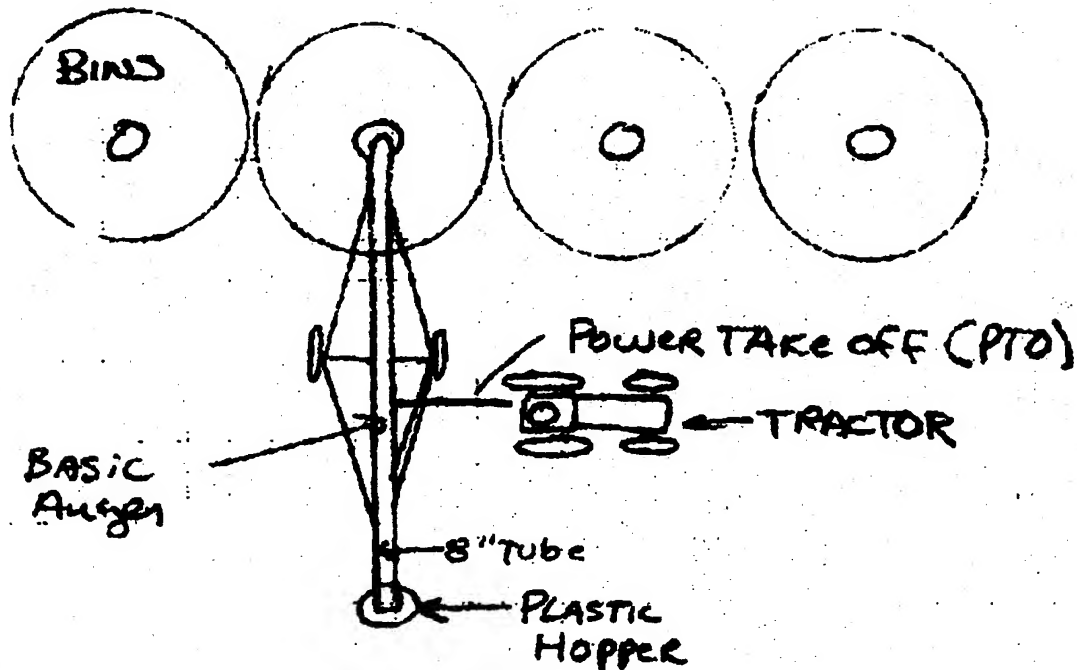
TRANSFER CONVEYORS

Straight and gooseneck models with 10" or 14" tubes as well as a drive-over model with a 14" tube. The 10" tube model requires 6 1/2" of clearance. The 14" tube model requires 6 1/2" of clearance.

All models give you gentle handling, big capacity and low maintenance. Electric, gas and hydraulic drives. Stainless steel options.

PLAN VIEW BASIC AUGER

p. 1/4

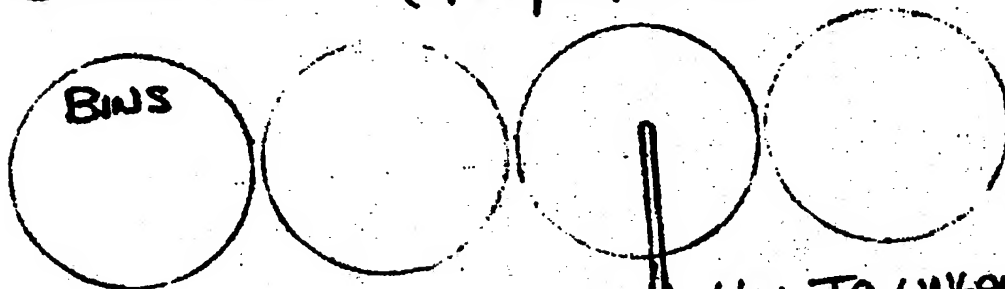
BACKGROUND

- IF BASIC Auger IS LARGER THAN 8" IN DIAMETER (TUBE SIZE X 50 FEET LONG IT CAN'T BE MOVED BY HAND AND REQUIRES A SMALL POWER UNIT TO MOVE IT.
- THE UNIT IS POWERED BY EITHER A TRACTOR VIA A PTO OR A GAS ENGINE

CONS

- MOVING LARGE AUGERS
- BACKING UP TO THE PLASTIC HOPPER WITH AN END-DUMP TRUCK (HITTING THE TARGET.)
- NOT POSSIBLE TO USE WITH BELLY DUMP TRUCK TRAILERS ()

1) CONVENTIONAL SWING AWAY AUGER/CONVEYOR^{P. 2014} (VERY POPULAR)



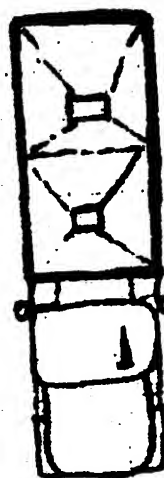
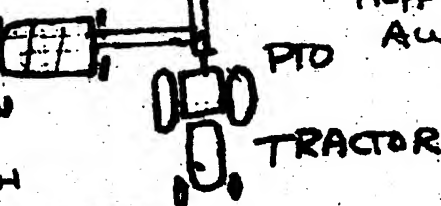
BACK GROUND

- SWING AWAY PIVOTS ON AN ARCH ABOUT ITS CONNECTION TO THE MAIN AUGER. THE SWING AWAY IS MOVED BY HAND
- FOR TRANSPORT THE SWING AWAY IS ROTATED PARALLEL TO THE MAIN AUGER.

How TO UNLOAD A SEMI TRAILER

- ROTATE SWING PARALLEL TO AUGER
- BACK TRUCK UP
- ROTATE SWING UNDER TRUCK
- DRIVE TRUCK AHEAD OR BACK TO POSITION TRUCK HOPPER OVER SWING AWAY.

SMALL TIRE
SWING AWAY SECTION
THE SWING IS LIFTED WITH A HAND CABLE WINCH OFF THE GROUND SO THE AUGER CAN BE TRANSPORTED.



← TWO HOPPER SEMI TRAILER

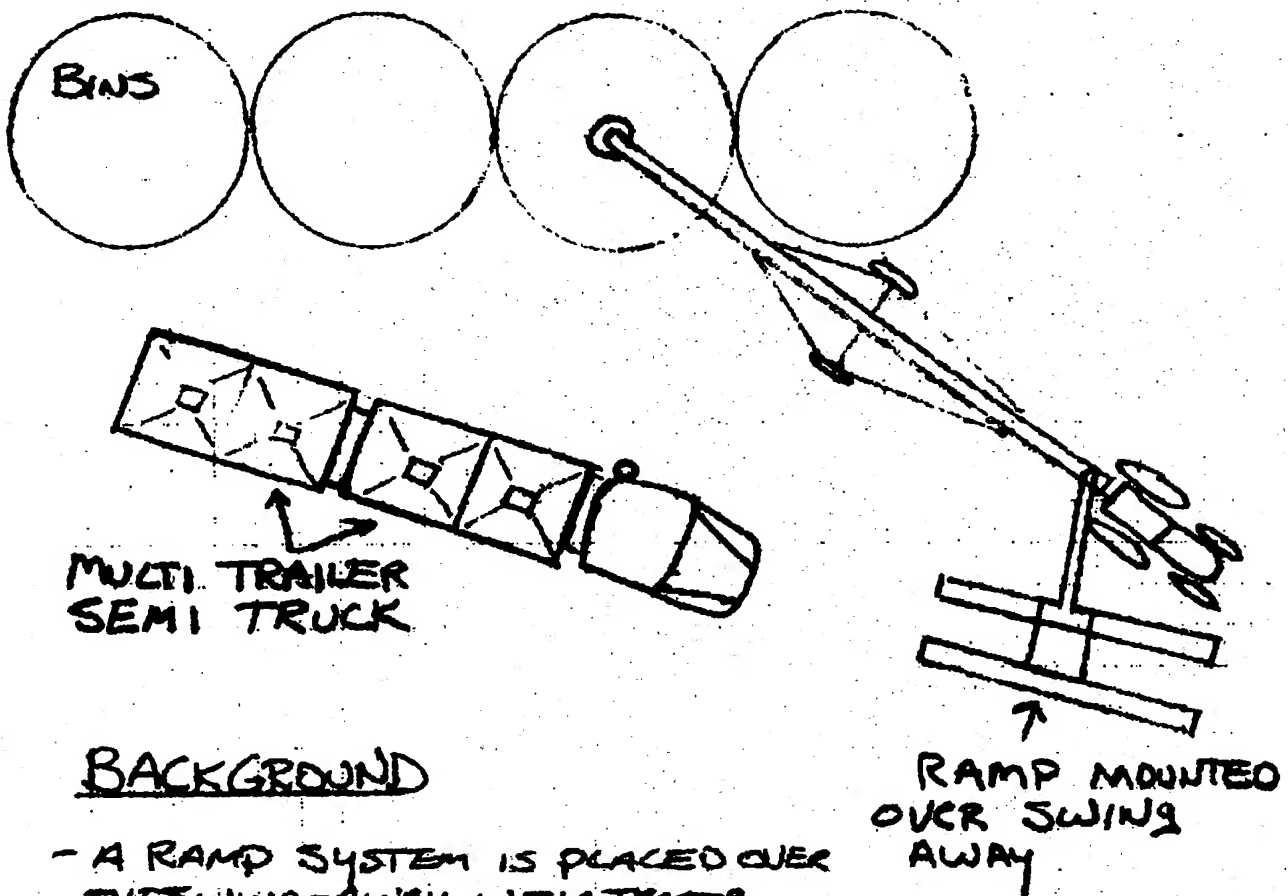
← SEMI TRUCK

CONS

EXTREMELY DIFFICULT TO UNLOAD MULTI-TRAILER UNITS WITH THIS SYSTEM.

2) SWING-AWAY WITH RAMP

p. 3 of 4



BACKGROUND

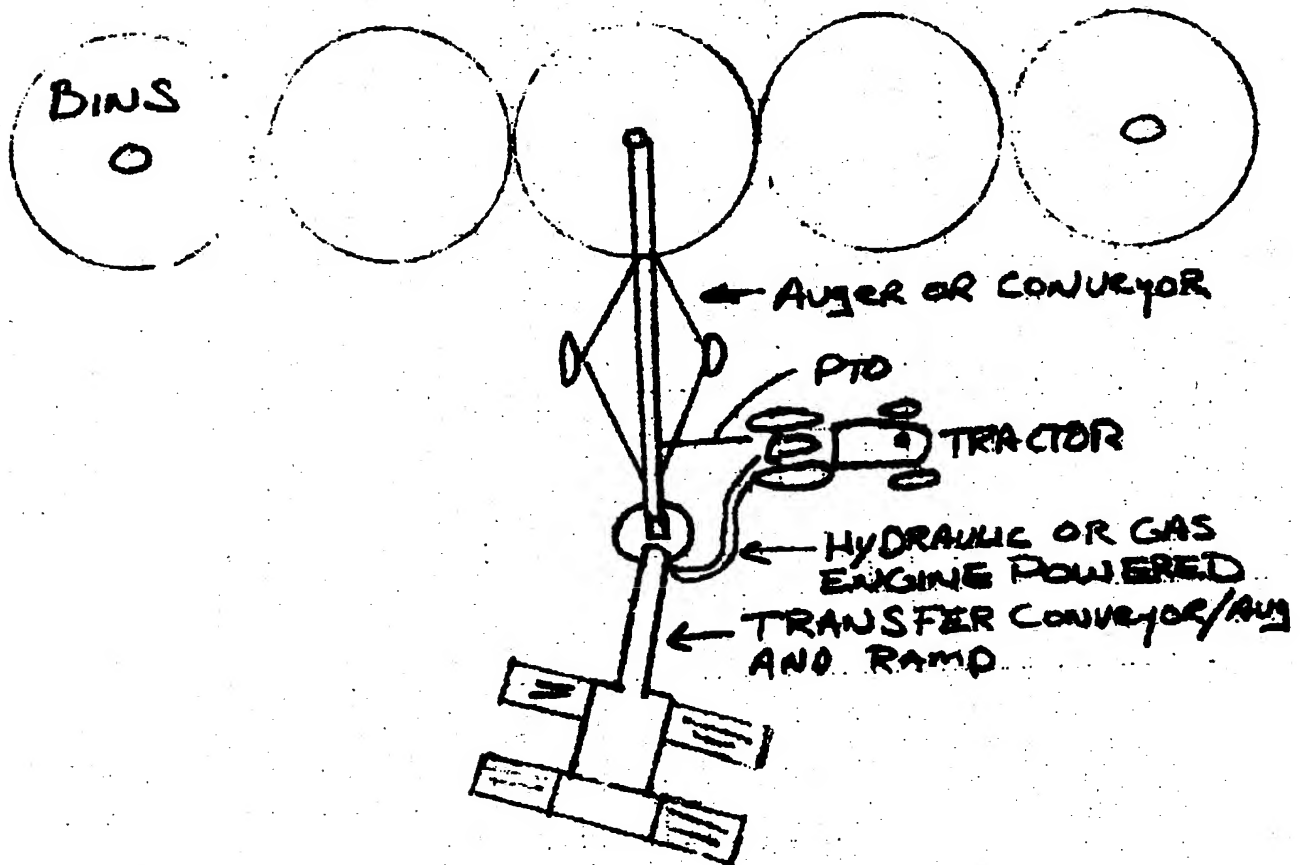
- A RAMP SYSTEM IS PLACED OVER THE SWING-AWAY WITH A TRACTOR.
- THE AUGER IS LOCATED AT A LONG ANGLE TO THE BINS TO ALLOW A MULTI-TRAILER SEMI TO DRIVE OVER THE RAMP

CONS

- POSITIONING OF RAMP OVER SWING AWAY IS TIME CONSUMING
- BIN LAYOUT AND YARD LAYOUTS WILL PREVENT SYSTEM FROM BEING ACCESSIBLE WITH A MULTI-TRAILER SEMI

Page 4

3) TRANSFER CONVEYOR/AUGER RAMP COMBO



BACKGROUND

- A TRANSFER AUGER OR CONVEYOR FEEDS A MAIN AUGER OR CONVEYOR.
- TRANSFER DEVICE TYPICALLY HYDRAULICALLY POWERED
- TRANSFER DEVICE MAY HAVE RAMPS SO IT CAN BE DRIVEN OVER
- TRANSFER DEVICE MAY NOT HAVE RAMPS, THEN IT WILL BE POSITIONED BY HAND AFTER TRUCK IS IN PLACE.

PROS-

- FREEDOM TO UNLOAD MULTI-TRAILER TRUCKS (SUPER 'B's)

CONS-

DIFFICULT TO MOVE (WORK!)

ISOMETRIC VIEW

APRIL 30/2002
JASON KIRSCH
BOURGAULT

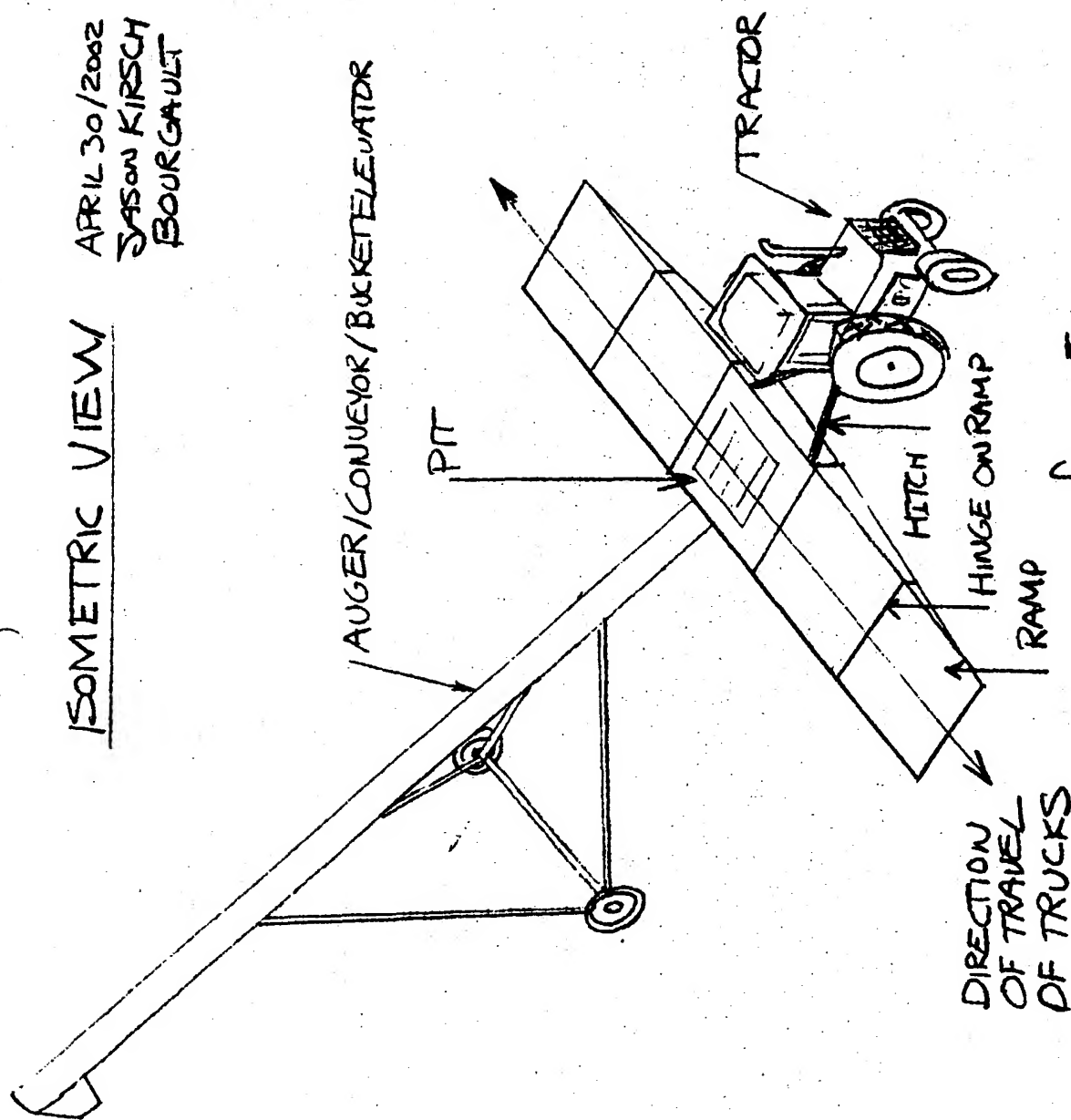


Figure 10

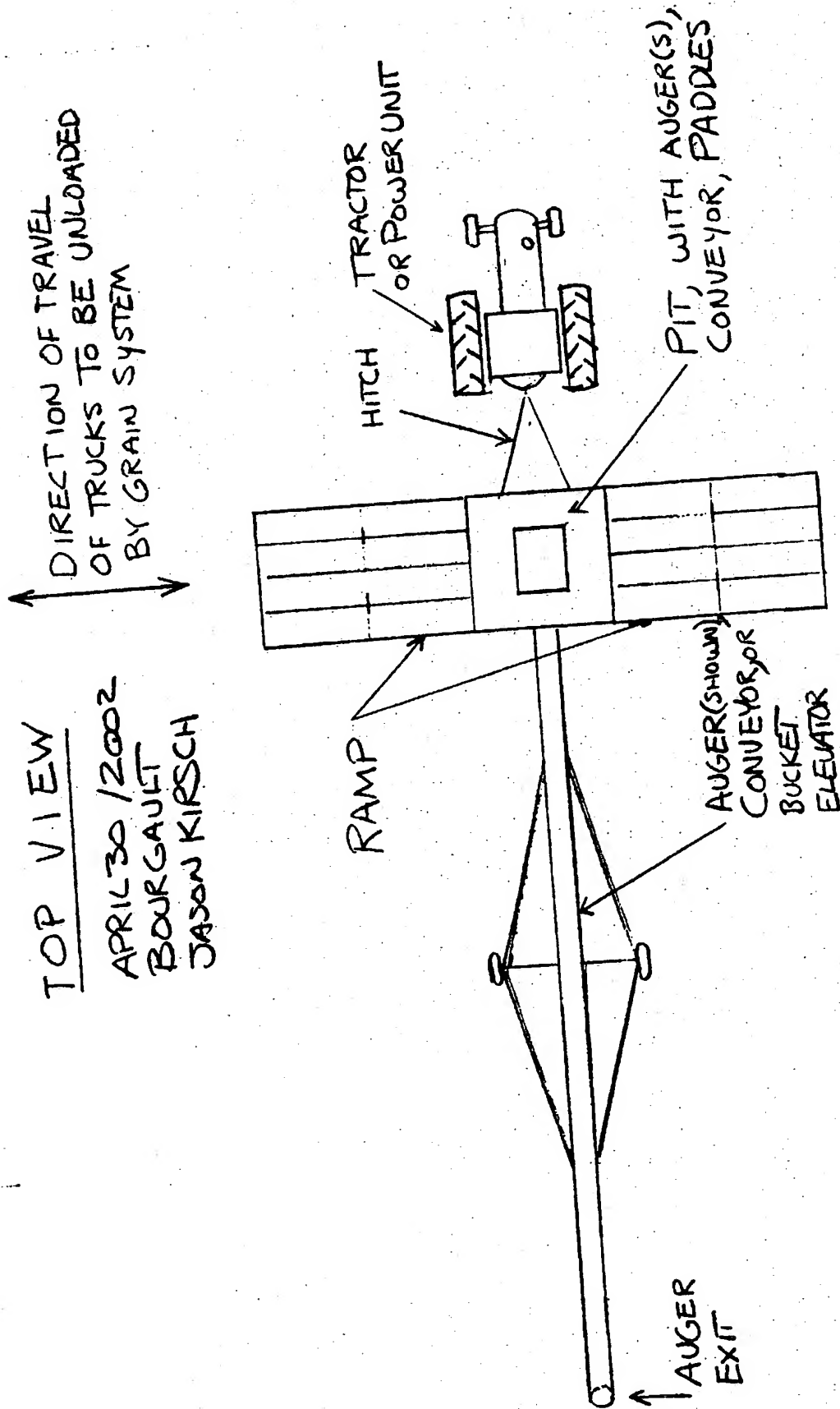


Figure 2.

APRIL 30/2002
JASON KIRSCH
BOURGault

SIDE VIEW

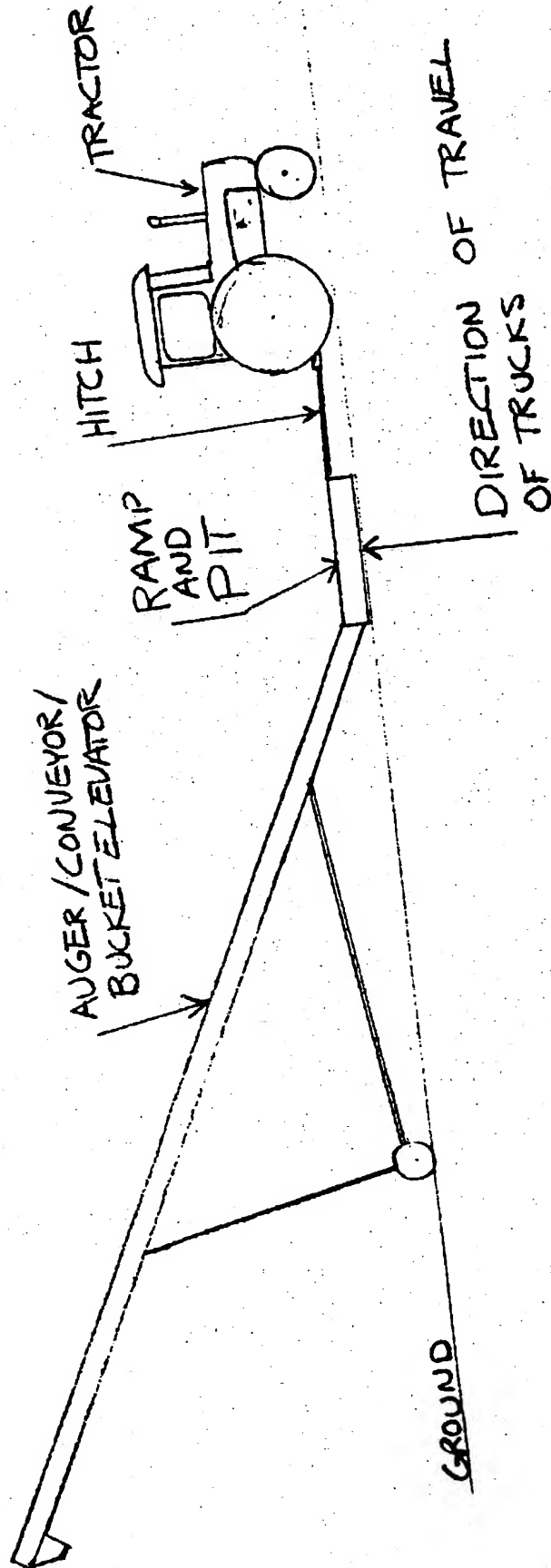


Figure 3.